



**Additional File 4: PIR and RIFIN/STEVR proteins share similar protein features, suggesting an evolutionary link between these two VSA gene families.** The upper half shows the annotated protein sequence of the ultra-conserved *P. berghei* BIR protein PBANKA\_010050. The lower half shows *P. falciparum* RIFIN protein PFI1815c. PFI1815c is the best hit in the *P. falciparum* proteome (E=0.00016) when searched with Pfam HMM model *Plasmodium\_Vir* (PF05795) using Hmmer3. The two proteins have similar length (~350 aa), have both a C-terminal transmembrane domain, and share similarity in their predicted secondary structural elements, suggesting similar 3D structures, probably of an "Armadillo-like" fold (Bultrini *et al.*, 2009). Similarity of secondary structural elements breaks down at the N-terminus, but this could be due in part to the presence of an additional signal peptide and export motif in RIFIN proteins. The figure is based on screenshots taken from PlasmoDB (<http://plasmodb.org/>).